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The hemodynamic variability after transverse abdominal block in lower abdominal surgeries

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ABSTRACT

Objective: Investigate the effects of pre-incisional bilateral transversus-abdominis plane block on intraoperative hemodynamics and analgesia in patients undergoing general anesthesia for elective lower abdominal surgery. *Methods*: The study included the selection of a total of 50 women who undergone general anesthesia for elective lower abdominal surgery and randomly allocated to one of two groups: Group A had 25 women who received pre-incisional transversus abdominis plane block, and group B included 25 women who didn't receive the block and taking into consideration matching for age with group A. Obese patients, those with a known allergy from drugs used in the study to perform transversus abdominis plane block, patient with cardiovascular or neuropsychiatric disorders, and on long-term analgesic therapy were excluded from this study. Before incision (basal), ten minutes, twenty minutes, and thirty minutes after incision, blood and pulse rate were measured, and the results were compared between research groups. *Results*: There was no discernible age difference between the study groups. Patients with transversus abdominis plane block had considerably lower mean arterial pressure (MAP) and heart rate (HR) 30 minutes after incision than controls. *Conclusions:* The transversus abdominis plane block is validand can be used safely to polish up the pain resulting from the surgical incision which help stabilization of HR and BP of the patient transversus abdominis plane block a painkiller that has analgesic effect intraoperatively and postoperatively.

Keywords: transverse abdominis block, hemodynamic changes, abdomen surgery

1. INTRODUCTION

Pain is the most prevalent symptomatic complaint in medicine, and understanding its etiology is essential for interpreting it in patients. Pain is still debated as a separate pathologic entity. Despite the evidence that pain is a disease, there has yet to be a definitive acknowledgement of the pathologic character of this condition (Raffaeli and Arnaudo, 2017). It's important to

distinguish between the phrases nociception and pain. Nociception is the process of nociceptors sensing noxious stimuli, then transducing and transmitting sensory nerve information from the periphery to the brain. Pain is associated with higher brain center processing and relates to the real unpleasant emotional and sensory experience brought on by nerve impulses. Pain reports are thus more than just a straight output of nociception; they entail interaction with a variety of inputs and can be viewed more properly via the lens of a neuromatrix (Chen and Sehdev, 2019).

Although the intraoperative safety of surgical patients has dramatically improved with recent advances in anesthesiology, cardiovascular complications are still the most significant risks to patients undergoing major non-cardiac surgery. Abdominal surgery significantly increases therisk of cardiovascular complications; one and many patients undergoing abdominal surgery have significant cardiovascular comorbidities before the procedure. Therefore, ensuring safety in patients undergoing abdominal surgery remains a considerable concern for anesthesiologists (Tsuchiya et al., 2003). One optimal anesthetic approach to minimize morbidity and mortality is maintaining a stable intraoperative hemodynamic status (Charlton et al., 2010). Surgical stimulation, on the other hand, can easily cause patients' blood pressure and heart rate to fluctuate repeatedly. To prevent these deleterious hemodynamic oscillations, the degree of anesthetic may need to be adjusted on the fly, which is a complex task that can lead to even more hemodynamic instability. Various peripheral nerve blocks can now be performed with a high degree of reliability thanks to recent improvements in ultrasound technology (Chin and Chan, 2008).

For abdominal surgery, transversus abdominis plane (TAP) block can be performed accurately under ultrasonographic guidance. The usefulness of these techniques in facilitating postoperative analgesia has been reported (Niraj et al., 2011). TAP block is a new regional anesthetic technique that provides analgesia to the parietal peritoneum as well as the skin and muscles of the anterior abdominal wall (Beloeil and Zetlaoui, 2011). It's also a good way to cut down on perioperative opioid use, maintain intraoperative hemodynamic stability, and speed up anesthetic recovery (Tsuchiya et al., 2012).

The goal of this study was to see how pre-incisional bilateral TAP blocks affected intraoperative hemodynamics and analgesia in patients having general anesthesia for elective lower abdominal surgery.

2. PATIENTS AND METHODS

Study design and setting

This prospective comparative study was conducted at the Gynecology and Obstetrics Department in Baghdad and Al-Yarmouk Teaching Hospitals, Baghdad, Iraq, for eight months from February 2020 until September2020.

Study Population and Sample Size

The study population included the selection of a total of 50 patients who undergone general anesthesia for elective lower abdominal surgery and randomly allocated to one of two groups:

Group A: Included 25 patients received pre-incisional transverses abdominis plane block.

Group B: Included 25 patient didn't receive the block and taking in consideration matching for age with group A. Patients were divided randomly into the groups (each patient assigned with a number, then patients with odd numbers were assigned as group A (25 patients), and patients with even numbers were designated as group B (25 patients). Intraoperative BP and HR were recorded.

Inclusion criteria

- ASA I and II.

Exclusion criteria

- Patient refusal
- Obese patients (BMI ≥ 30 kg/m^2)
- Known allergy from drugs used in the study to perform TAP block
- Patients with cardiovascular disorders
- Neuropsychiatric disorders even taking treatment
- Patients on long-term analgesic therapy

Data Collection

Demographic data as age

SBP, DBP, MAP, and HR were recorded as follows:

Before incision (basal)

10 minutes after the incision
20 minutes after the incision
30 minutes after incision.

TAB block procedure

- General anesthesia was induced in the patients in the two groups, using propofol (2.5 mg/kg), fentanyl (2.5 mcg/kg), ketamine (1 mg/kg), and rocuronium (1 mg/kg), followed by orotracheal intubation.
- Ventilation was mechanical
- Anesthesia was maintained by isoflurane
- For patients of group A, bilateral ultrasound-guided TAP block was performed using lidocaine 3 mg (diluted in 20 ml normal saline) on each side.
- The same anesthesiologist performed all TAP blocks, and the same monitor was used for taking heart rate and blood pressure.

Statistical Analysis

SPSS version 23 was used to analyze the data. The information is displayed in the form of a mean, standard deviation, and ranges. Frequencies and percentages are used to present categorical data. The continuous variables were compared between research groups using a two-tailed student t-test. Significant was defined as a P – value of less than 0.05.

3. RESULTS

Figure 1 depicts the age distribution of research groups. Patients in the study ranged in age from 28 to 49 years old, with a mean of 37.18 years and a standard deviation (SD) of 5.73 years. The TAB block group and control group had the highest proportion of study patients under the age of 40 (56 percent and 52 percent, respectively).

Mean Arterial Pressure (MAP)

Figure 1 and table 1 demonstrate a comparison of research groups in terms of intraoperative MAP mean. The mean MAP in patients with TAP block 30 minutes after incision was substantially lower than in controls (109 versus 94.04 mmHg, P= 0.001). There were no statistically significant changes (P 0.05) in MAP before incision and 10 and 20 mints after incision between study groups.

Heart Rate (HR)

In the figure 1 and table 1, the mean intraoperative heart rate of the study groups is compared. The mean HR in patients with TAP block 30 minutes after incision was significantly lower than in controls (98 versus 90.84 beats/mint., P= 0.001). In terms of heart rate before incision, 10 and 20 minutes, no statistically significant differences (P 0.05) between study groups.

Table 1 Assessment of demographic and clinical variables between the study groups

	TAB block	Control	p-value
Number	25	25	-
Age (y), mean ± SD	37.48 ± 5.86	36.88 ± 5.71	0.716
MAP (mmHg)			
Before Incision	91.92 ± 6.34	94.56 ± 8.67	0.225
10 Mints after incision	97.8 ± 7.43	95.44 ± 7.63	0.274
20 Mints after incision	96.36 ± 6.68	93.52 ± 6.49	0.134
30 Mints after incision	94.04 ± 6.96	109.0 ± 8.91	0.001
Heart Rate (beats/mint)			
Before Incision	84.2 ± 5.53	85.72 ± 7.05	0.401
10 Mints after incision	92.48 ± 4.93	90.76 ± 5.27	0.24
20 Mints after incision	92.68 ± 4.87	90.0 ± 5.96	0.088
30 Mints after incision	90.84 ± 6.15	98.0 ± 6.99	0.001

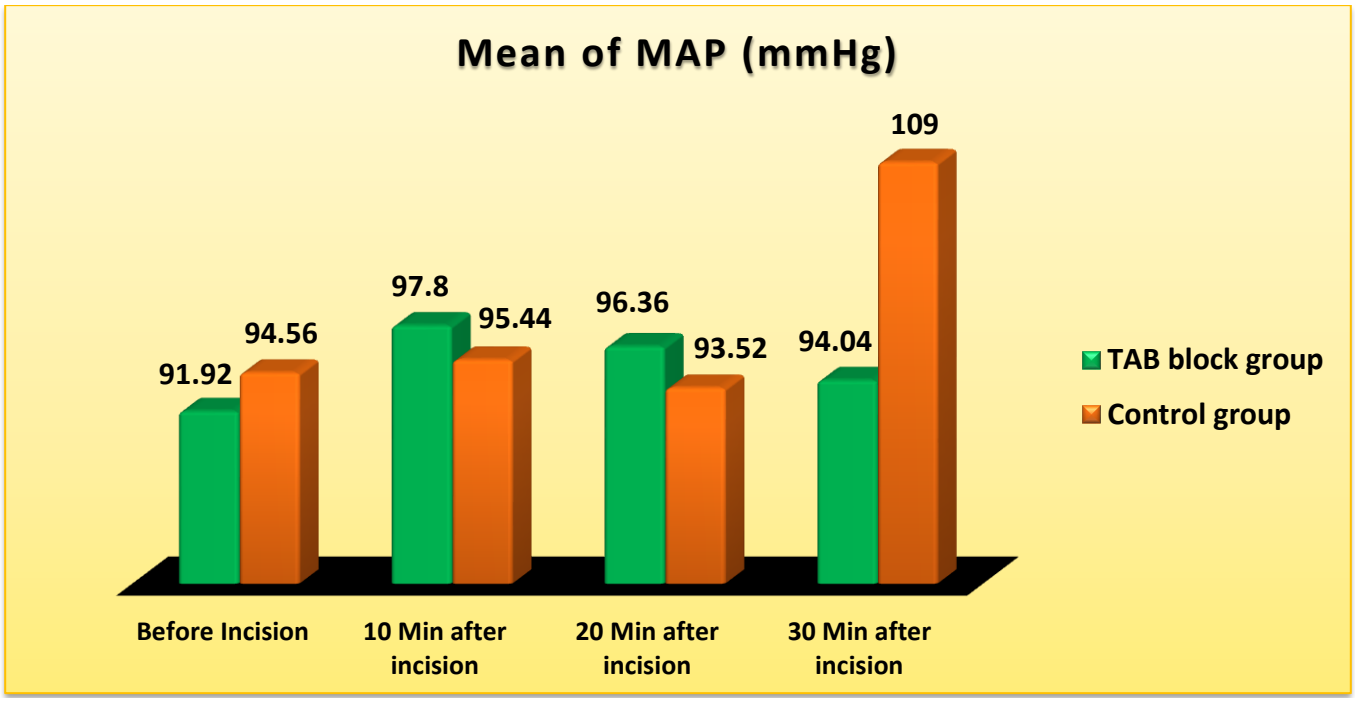

Figure 1 Means of intraoperative MAP

4. DISCUSSION

In the current study, 50 patients participated. The TAB block group included 25 patients who received general anesthesia with TAB block and the control group, including those who underwent general anesthesia without TAB block. In the current study, the mean of MAP was significantly lower in patients with TAP block 30 mints after incision than in controls (109 versus 94.04 mmHg, P= 0.001), while no statistically significant differences between study groups in means of MAP before incision and 10 and 20 mins after incision (P ≥ 0.05). In their study in 2012, Tsuchiya and colleagues were incomparable to other studies when 68 patients were undergoing elective abdominal surgery and were randomized to a group receiving general anesthesia and TAP block (Group T, N.=33) or a group receiving general anesthesia alone (Group G, N.=35). Results obtained showed that Blood pressure just before the start of anesthesia did not differ significantly between both groups (Tsuchiya et al., 2012).

In a study by Paul et al., (2017) seventy women undergoing total abdominal hysterectomy were divided into two groups: Group A (n = 35) had ropivacaine TAP block and Group B (n = 35) received normal saline TAP block, followed by general anesthesia. The results acquired were not the same as the current one. When the two groups arrived in the operating room, their mean arterial blood pressure (MABP) was comparable (94.97 13.46 mmHg versus 96.36 12.41 mmHg, p = 0.533). There was no statistical difference in mean arterial blood pressure between the two groups before the surgical incision. MAP was substantially higher in Group B (P=0.004) after the surgical incision (Paul et al., 2017). Erdogan et al., (2017) performed 49 patients, in contrast to the current study. Patients who got TAP block in conjunction with general anesthesia were assigned to Group 1, while those who just received general anaesthetic were assigned to Group 2. The MAP alterations in both groups were similar, according to the findings. Furthermore, there were no significant variations in MBP across groups at any point during the study. The mean HR in patients with TAP block was lower than in controls 30 minutes after incision (98 versus 90.84 beats/mint., P= 0.001). In terms of heart rate before incision, 10 and 20 minutes after incision, we found no statistically significant differences (P 0.05) between study groups.

Tsuchiya et al., (2012) randomized 68 patients undergoing elective abdominal surgery to a group receiving general anesthesia and TAP block (Group T, N=33) or a group receiving general anesthesia alone (Group G, N.=35) and found similar results, with heart rates just before the start of anesthesia not differing significantly between the two groups. In a research published in 2017, Paul and colleagues randomly allocated 70 women undergoing total abdominal hysterectomy to one of two groups: Group A had TAP block followed by general anesthesia, or Group B received TAP block followed by general anesthesia. They detected no statistically significant change in heart rate between the two groups prior to surgical incision. After the surgical incision, the heart rate of Group B was much greater. There was a lot of consistency in other investigations. Erdogan et al., (2017) surveyed 49 patients and separated them into two groups. Patients who got TAP block in conjunction with general anesthesia were assigned to Group 1, while those who just received general anaesthetic were assigned to Group 2. The HR changes in both groups were similar, according to the findings. Furthermore, there were no significant variations in HR across groups at any point during the study.

The sample size of each study, whether young or old patients, general condition of the participants and state of ASA of each patient, type of procedures, anesthesia, and drugs used for each of them, and an experienced anesthesia team enforced strict monitoring were among the factors that determined the differences observed among the studies mentioned above. TAP block has strong opioid-sparing effects in the intraoperative and postoperative periods, which is the most relevant therapeutic implication. Furthermore, because TAP block has opioid-sparing effects, those patients who are morbidly obese or have obstructive sleep apnea will benefit the most from it. Preincisional TAP block will also benefit patients with ischemic heart disease or stenoticvalvular lesions such as mitral or aortic stenosis, where tachycardia is undesirable. TAP block also prevents surgical incisions from causing hemodynamic reactions. In patients with coagulopathy, it may be a safer option to neuraxial block for intraoperative and postoperative analgesia (Bhattacharjee et al., 2014).

5. CONCLUSION

Through nerve block of the anterior abdomen wall, pre-incisional TAP block regulated hemodynamic responses to surgical stress in patients having lower abdominal surgery. The TAP block is legitimate and can be used safely to reduce pain caused by surgical incisions, as well as to assist regulates the patient's pulse rate and blood pressure. As a result, the TAP block is classified as a painkiller with analgesic effect both intraoperatively and postoperatively.

Author contribution

Maytham Murtadha Kadhim: Conception and design of the work, the acquisition, analysis, interpretation of data for the work, and Drafting the work.

Khaleel Jummah Kareem: Conception and design of the work, interpretation of data for the work, and revising it critically for important intellectual content

Muthana Abdul Kadhim Saad: Conception and design of the work, and Drafting the work, and finally revising it critically for important intellectual content

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Conflict of Interest

The authors declare that there are no conflicts of interests

Informed consent

Written informed consent was obtained from all individual participants included in the study. Additional informed consent was obtained from all individual participants for whom identifying information is included in this manuscript.

Ethical approval for human

All procedures performed in studies involving human participants were under the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards (Code: 2020/B064).

Data and materials availability

All data associated with this study are present in the paper.

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